

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-16. (cancelled)

17. (currently amended) A membrane-electrode assembly for the electrolysis of water, comprising

- an ion-conducting membrane having a front side and a rear side
- a first catalyst layer on the front side
- a first gas diffusion layer on the front side
- a second catalyst layer on the rear side
- a second gas diffusion layer on the rear side

wherein the first gas diffusion layer has smaller planar dimensions than the ion-conducting membrane and the second gas diffusion layer has essentially the same planar dimensions as the ion-conducting membrane, wherein the ion-conducting membrane has a free surface which is not supported by a gas diffusion layer on the front side and wherein the margin of the gas diffusion layers and the free surface of the ion-conducting membrane are surrounded by a sealing material which penetrates into the peripheral region of the membrane-electrode assembly to a depth of at least 1mm.

18. (previously presented) A membrane-electrode assembly according to Claim 17, wherein the first catalyst layer on the front side and the second catalyst layer on the rear side of the ion-conducting membrane have different planar dimensions.

19. (cancelled)

20. (previously presented) A membrane-electrode assembly according to Claim 17, wherein the catalyst layers on the front side and on the rear side comprise catalysts comprising precious metals and optionally ion-conducting materials.

21. (cancelled)

22. (previously presented) A membrane-electrode assembly according to Claim 17, wherein the gas diffusion layer on the front side comprises a carbon-based material, such as a graphitized or carbonized carbon fibre paper, a carbon fibre nonwoven, a woven carbon fibre fabric or a similar material, and the gas diffusion layer on the rear side comprises a non-carbon based material, such as a woven metal mesh, a metal nonwoven, a gauze, a metal staple fibre, a metal multi-filament or another porous metallic structure.

23. (cancelled)

24. (cancelled)

25. (cancelled)

26. (currently amended) A membrane-electrode assembly according to Claim 17 [[23]], wherein the ion-conducting membrane comprises an organic polymer such as a proton conducting perfluorinated polymeric sulphonic acid compound, a doped polybenzimidazole, a polyether ketone, a polysulphone or an ion-conducting ceramic material and has a thickness between about 10 and about 200 μm .

27. (currently amended) A membrane-electrode assembly according to Claim 17 [[23]], wherein the second catalyst layer on the rear side comprises a catalyst containing a precious metal for anodic evolution of oxygen, preferably a catalyst based on iridium or ruthenium.

28. (currently amended) A membrane-electrode assembly according to Claim 17 [[25]], wherein the sealing material comprises a thermoplastic polymer from the group consisting of polyethylene, polypropylene, polytetrafluoroethylene, PVDF, EPDM, polyester, polyamide, polyamide elastomers, polyimide, polyurethane, silicones, silicone elastomers, and/or a thermoset polymer from the group consisting of epoxides and cyanoacrylates.

29. (currently amended) A process for producing the membrane-electrode assembly according to Claim 17, which comprises the steps of:

- (a) coating an ionomer membrane with catalyst on one side;
- (b) coating a carbon-based gas diffusion layer with catalyst on one side;
- (c) joining the carbon-based, catalyst-coated gas diffusion layer to the uncoated side of the ionomer membrane, with the catalyst layer of the gas diffusion layer coming into contact with the ionomer membrane;
- (d) ~~optionally~~, applying a non-carbon based gas diffusion layer to the coated side of the ionomer membrane, with the catalyst layer on the ionomer membrane coming into contact with the non-carbon based gas diffusion layer; and
- (e) applying a sealing material in the peripheral region of the assembly, so that the sealing material penetrates into the peripheral region of the assembly to a depth of at least 1mm.

30. (previously presented) A process according to Claim 29, wherein the joining of the carbon-based, catalyst-coated gas diffusion layer to the uncoated side of the ionomer membrane is carried out at elevated temperature and/or elevated pressure.

31. (previously presented) A process according to Claim 29, wherein the application of the sealing material is effected by means of melting processes, injection moulding, heat pulse welding and/or hot pressing.

Applicant: Zuber, et al.
Serial No.: 10/564,798
Filing Date: June 21, 2007
August 19, 2010 Response to April 19, 2010 Office Action
Page 6 of 11

32. (currently amended) An electrolyser, regenerative fuel cell, oxygen-producing electrode or another electrochemical device comprising ~~that uses~~ the membrane-electrode assembly according to Claim 17 [[1]].